

WHAT IS CLAIMED IS:

1. A permanent magnet type reluctance electric motor comprising:

a stator including a stator iron core and having armature coils placed inside slots; and

5 a rotor provided with a plurality of magnetic barriers formed by cavities and placed on an inner side of the stator in such a manner that sections where a magnetic flux can easily pass (d-axis) and sections where a magnetic flux cannot easily pass (q-axis) are alternately formed, and made of a rotor iron core having permanent magnets in cavities, characterized in that:

10 the rotor satisfies a relationship of $PL / 2\pi RW_{qave} \geq 130$,

15 where W_{qave} [m] indicates an average thickness of the rotor iron core on an outer side in a radial direction of the rotor with respect to cavities arranged in a q-axis direction, L [m] indicates a width 20 in a circumferential direction of the cavities, P indicates the number of poles and R [m] indicates the radius of the rotor.

25 2. A permanent magnet type reluctance electric motor according to claim 1, wherein the rotor satisfies a relationship of $PL / 2\pi RW_{qave} \geq 200$.

3. A permanent magnet type reluctance electric motor according to claim 1, wherein the cavities

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arranged in the q-axis direction are made to go through
to an outer circumferential portion in a radial
direction of the rotor.

4. A permanent magnet type reluctance electric
motor comprising:

a stator including a stator iron core and having
armature coils placed inside slots; and

a rotor provided with a plurality of magnetic
barriers formed by cavities and placed on an inner side
of the stator in such a manner that sections where a
magnetic flux can easily pass (d-axis) and sections
where a magnetic flux cannot easily pass (q-axis) are
alternately formed, and made of a rotor iron core
having permanent magnets in cavities, characterized in
that the rotor satisfies a relationship of:

$$W_{d\min}P / 2\pi R \geq 65,$$

where $W_{d\min}$ [m] indicates a minimum distance
between a cavity arranged in the q-axis direction and
a permanent magnet, P indicates the number of poles and
R [m] indicates the radius of the rotor.

5. A permanent magnet type reluctance electric
motor according to claim 4, wherein the rotor is formed
to have a structure which satisfies a relationship of:

$$W_{d\min}P / 2\pi R \geq 87.$$

6. A permanent magnet type reluctance electric
motor comprising:

a stator including a stator iron core and having

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armature coils placed inside slots; and

5 a rotor provided with a plurality of magnetic barriers formed by cavities and placed on an inner side of the stator in such a manner that sections where a magnetic flux can easily pass (d-axis) and sections where a magnetic flux cannot easily pass (q-axis) are alternately formed, and made of a rotor iron core having permanent magnets in cavities, characterized in that the rotor satisfies a relationship of:

10 $95 \leq W_{dave}P / 2\pi R \leq 160$,

where W_{dave} [m] indicates an average distance between a cavity arranged in the q-axis direction and a permanent magnet, P indicates the number of poles and R [m] indicates the radius of the rotor.

15 7. A permanent magnet type reluctance electric motor according to claim 6, wherein the rotor satisfies a relationship of: $110 \leq W_{dave}P / 2\pi R \leq 130$.

20 8. A permanent magnet type reluctance electric motor according to claim 1, wherein the width in the radial direction of a cavity situated in the q-axis direction is increased towards the center in the q-axis direction.

25 9. A permanent magnet type reluctance electric motor according to claim 1, wherein the angle of the permanent magnets is changed so that the distance between a cavity situated in the q-axis direction and a permanent magnet becomes maximum at a position on an

inner diameter side of the center of the cavity in the q-axis direction.

10. A permanent magnet type reluctance electric motor comprising:

a stator including a stator iron core and having armature coils placed inside slots; and

10 a rotor provided with a plurality of magnetic barriers formed by cavities and placed on an inner side of the stator in such a manner that sections where a magnetic flux can easily pass (d-axis) and sections where a magnetic flux cannot easily pass (q-axis) are alternately formed, and made of a rotor iron core having permanent magnets in cavities, characterized in that the rotor satisfies a relationship of:

15 $0.45 \leq w_t / \tau \leq 0.8,$

where τ [m] indicates the pitch of the slot and w_t [m] indicates the width of the teeth.

20 11. A permanent magnet type reluctance electric motor according to claim 1, wherein the stator is formed to have a structure which satisfies a relationship of: $0.45 \leq w_t / \tau \leq 0.8.$

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